

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

ALLEY CROPPING

(Acre)

CODE 311

DEFINITION

Trees or shrubs planted in a set or series of single or multiple rows with agronomic, horticultural crops, or forages produced in the alleys between the rows of woody plants.

PURPOSES

Produce tree or shrub products (wood, nuts, berries, fodder, mulch, etc.) along with crops or forages to improve or optimize the economic viability of the operation. This purpose may be accomplished alone or concurrently with one or more of the following purposes:

- Improve crop or forage quality and quantity by enhancing microclimatic conditions.
- Reduce excess surface water runoff and erosion.
- Improve utilization and recycling of soil nutrients.
- Reduce excess subsurface water or control water table depths.
- Provide food and cover habitat for wildlife.
- Create habitat for biological pest management.
- Improve crop diversity, quantity, quality and economic returns.
- Decrease movement offsite of nutrients or chemicals.
- Enhance the aesthetics of the area.
- Increase net carbon storage in the vegetation and soil.

CONDITIONS WHERE PRACTICE APPLIES

On all lands where trees, shrubs, crops and/or forages can be grown in combination.

CRITERIA

General Criteria Applicable To All Purposes

Plant Selection

The location, layout, species, and density of the trees and shrubs will accomplish the purpose and intended function for both the agronomic, horticultural, or forage crops as well as the trees and/or shrubs. Plant species selection will be based on the following:

- Combinations of crops or forages and woody plants shall be compatible, complementary, and provide the products or crops that meet the landowner's objectives.
- Crops or forages shall be adapted to the climatic region, soil, be marketable and suite the landowner's equipment and management capabilities.
- Crop or forage sequence and woody species selection will be determined using an acceptable nutrient balance procedure. Selected crops, forages and woody species will maximize the utilization and recycling of soil nutrients, animal wastes, plant residues, and maintain soil the organic matter content.
- Crops or forages and woody plants will be selected for proper rooting depth and water requirements, which shall not to exceed the available soil water.
- Select pest resistant crop, forage, tree, and shrub species.
- Avoid selecting tree or shrub species, which provide habitat to animal, bird, or insect species, which are considered to be pests of the accompanying crop or forage.
- Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is too low for the selected species.

- For optimal carbon storage, select plant species that are adapted to the site to assure strong health and vigor and plant the full stocking rate for the site.
- Avoid selecting tree or shrub species, which provide habitat to pests of the accompanying crop or forage.

Design

The distance between the trees or shrubs will be determined by the management objectives, light requirements and growth period of the crops or forages in the alleys, as well as erosion control needs, and widths for machinery access.

Crops (woody and herbaceous) will be grown in a planned conservation management system.

Tree or shrub rows will be oriented on the contour to control water erosion or perpendicular to troublesome winds to control wind erosion.

Soil erosion by wind or water will be controlled by vegetative or other means until the alley cropping design is fully functional.

Avoid planting trees or shrubs where they will interfere with structures and above or below ground utilities.

Planting dates, handling and planting of the seed or seedlings will be accomplished to assure acceptable plant survival.

Only viable and high quality planting stock or seed of adapted woody species will be used for establishing the tree or shrub rows.

Site preparation will be sufficient for establishment and growth of selected species and appropriate for the site.

Comply with applicable federal, state and local laws and regulations, during the installation, operation (including product harvesting), and maintenance of this practice.

Additional Criteria to Reduce Surface Water Runoff and Erosion

Tree or shrub rows will be oriented on or near the contour to reduce water erosion.

To reduce surface water runoff and erosion, herbaceous ground cover will be established in conjunction with the tree or shrub rows.

To reduce wind erosion, tree or shrub rows will be oriented as close as possible perpendicular to erosive winds.

CONSIDERATIONS

Crop, forage, tree and/or shrub varieties selected should be tolerant to herbicides that will be used in the management of the crops, forages, trees or shrubs.

Spacing between the rows of trees or shrubs may be adjusted, within the limits listed above, to accommodate equipment widths and turn-arounds.

Species diversity including use of native species should be considered to avoid loss of function due to species-specific pests.

Coppice ability of selected species of trees and shrubs should be considered when they are to be pruned periodically.

High value trees or shrubs should be selected to maximize economic returns.

Anticipate possible off-site effects and modify the practice design accordingly.

Consider cultural resources when planning this practice.

Cultural Resources Considerations

Determine if installation of this practice with any others proposed will have any effect on any cultural resources. NRCS' objective is to avoid any effect to cultural resources and protect them in their original location. GM 420, Part 401, the California Environmental Handbook and the training for the California Environmental Assessment Worksheet specify how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information, about cultural resources. The Environmental Handbook is online at www.ca.nrcs.usda.gov/rts/rts.html.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered

species or their habitat. NRCS' objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as, freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning eggs in gravel's, and rearing of young may preclude activities in the stream that may directly affect the stream habitat during those periods. For example there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, and narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The trees, shrubs, crops, and/or forages will be inspected periodically and protected from adverse impacts including insects, diseases or competing

vegetation. The trees or shrubs will also be protected from fire and livestock damage.

All other specified maintenance measures and techniques of tree/shrub establishment will be continued until plant survival and establishment are assured. This includes replacement of dead and dying trees or shrubs and control of undesirable competing vegetation.

Any removals of tree or shrub products and use of fertilizers, pesticides, and other chemicals shall be conducted in a manner that maintains the intended purpose.

The type, use and timing of maintenance equipment will be appropriate to accomplish operation and maintenance tasks while not damaging or degrading the site and soil conditions.